

cally 400 KΩcm) that is the same order as for the skin, optimum stimulation can be carried out without pain being caused while keeping the consumed power to a minimum.

[0048] The gel is not required in the case of electrical stimulation to the fingertips. A bulky (0.5 millimeter to 1.0 millimeter) high-resistance horny layer exists at the fingertip skin so as to bestow the current diffusion effects described above. In the electrical stimulation of people's foreheads, when the gel layer was not provided, we confirmed that use of the device was completely not possible due to a sense of pain. Further, when a gel layer of a low resistance typically used in the electrical stimulation was used, we confirmed that it was difficult for a sensation to occur.

[0049] To conclude, a conductive gel layer is provided detachably at the stimulation electrode substrate so as to cover the stimulation electrode substrate. The electrical stimulation section includes a stimulation electrode substrate and a conductive gel layer provided detachably at the side of the stimulation electrode substrate where the electrodes are provided. The stimulation electrodes supply electrical stimulation to the skin (forehead) via the conductive gel layer. The conductive gel preferably has a resistance value equivalent to that of the horny layer of the skin. Preferably, the thickness of the conductive gel layer is 0.3 to 2.0 millimeters. The thickness of the conductive gel layer is more preferably 0.5 to 1.0 millimeters.

[0050] Next, a description is given of an electrical stimulation presentation board suited to the curvature of a person's forehead. Flexible substrates currently used can be easily bent but cannot be expanded or contracted. Application as is to surfaces where the Gaussian curvature is not zero such as with a person's forehead is therefore not possible. Further, recently developed substrates employing thermoplastic resins can be deformed in a manner including compression and expansion by applying heat but matching completely with the shape of a specific forehead of an individual wearer is difficult. The conductive gel layer described above absorbs indentations of the skin to a certain extent as a result of being elastic. However, the optimum thickness of the conductive gel layer is determined depending on other requirements as described previously. The extent to which a role appropriate for the shape of a forehead can be achieved is therefore restricted. Adaptability to the curvature of a person's forehead can therefore be achieved by inserting cuts into the substrate. Wiring on the substrate is therefore substantially restricted by the cuts. A first candidate is a technique where, as shown in FIG. 4, the whole body is formed from a large flexible substrate 4, with inner cuts 40A therein. In the case of this example, 512 points overall are divided into eight regions 40 of 4×2, with electrodes for sixty-four points existing at one region 40. As shown in FIG. 5, one set of a switching circuit 6A and a communication circuit 6B corresponds to electrical stimulations at 64 points. This ensures that the cuts 40A of the flexible substrate 4 do not disturb the most complex "wiring from the switching circuit 6A to each of the electrodes 5". The "communication circuit 6B" referred to here is that connecting between the stimulation pattern generation section 2A, the sixty-four point stimulation generation section, and sixty-four point stimulation generation sections (FIG. 5).

[0051] The second candidate is a method of arranging the stimulation electrodes 5 in a row at a thin belt-shaped flexible substrate 41 (FIG. 6). The substrate mounted with the electric circuit element (hereinafter referred to as the circuit substrate) 8 and the flexible substrate 4, i.e. the belt-shaped

flexible substrate (hereinafter referred to as the electrode substrate) 41 are connected by a connector 8A. Stimulation electrodes 5 are then formed on the electrode substrate. Each strip of the electrode substrate 41 can be curved and can shift to the left and right. It is therefore possible to achieve adaptability to the forehead shape that is close to being spherical, i.e. where the Gaussian curvature is not zero. It is preferable for an elastic layer 9 to be provided between the electrode substrate 4 and the circuit substrate 8. Silicon rubber and urethane foam etc. can be considered as the elastic layer 9. In particular, urethane foam is the prominent candidate because it has been applicable to a pillow etc. that can be adapted to the shape of a person's forehead. It is also preferable for friction at the interface of the elastic layer 9 and the electrode substrate 4 to be low. It is further preferable for a lubricant or a lubricating coating to be applied to the flexible substrate surface or the elastic layer surface, or to both. In FIG. 6, electrodes are arranged in a row on each one strip of the flexible substrate but pluralities of rows can also be provided.

[0052] According to the method described above, the circuit substrate 8 and the electrode substrate 4 are separate and connected by the connector 8A but integration of the circuit substrate 8 and the electrode substrate 4 can also be considered. A method for this is given in FIG. 7. The electrode portion is the strip-shaped flexible substrate 41 but the portion the electrical circuit elements are mounted on can be the same flexible substrate or can be backing on a stiff plate. In recent substrate fabrication technology, it is possible to make a flexible substrate and a usual stiff substrate in a coupled manner and the adoption of this technology is also possible.

[0053] To conclude, the electrical stimulation presentation board can be made lightweight by integrating the stimulation electrode substrate, the switching circuit, and the communication circuit. In a specific example, the electrical stimulation presentation board includes a stimulation electrode substrate provided with stimulation electrodes where the stimulation electrodes are provided on the surface of the stimulation electrode substrate. A switching circuit for selecting stimulation electrodes providing stimulation and a communication circuit are provided on the rear surface side of the stimulation electrode substrate. In one mode, the switching circuit and the communication circuit are comprised of ICs. The switching circuit is electrically connected to each electrode of the stimulation electrode substrate and is electrically connected to the control section via the communication circuit. In one mode, the circuit substrate having the switching circuit is electrically connected to the stimulation electrode substrate via a connector but the circuit substrate and the stimulation electrode substrate can also be formed integrally. In one mode, the electrical stimulation presentation board can be fitted to a person's forehead by coupling the rear side to the headband 11 via an elastic body 10 (FIG. 6C).

[0054] The stimulation electrode substrate is formed in a curved shape along the shape of a person's forehead or can be formed so as to be capable of curving. In one mode, the electrode substrate is comprised of a plurality of small area substrates, with a curved shape being formed by adjusting orientation of each small area substrate and connecting the small area substrates. In a further mode, the stimulation electrode substrate is comprised of a plurality of small area sections (divided into a plurality of portions) and the orientation of each small area section can be changed. The stimulation electrode substrate with a curved shape along the curve of a person's forehead is then formed by changing the orientation